

**CHEMICAL ENGINEERING 4903-1  
PROJECTS LABORATORY-I  
Fall Semester, 2017**

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Course Webpage: <http://www.che.utah.edu/~ring/>

**PREREQUISITES:** CHFE 3603, 3553 and 5103. Major standing; **CoReq:** CHFEN 4203.

**SCHEDULE: CH EN 4903-001 - Projects Lab I**

M,W / 12:55 PM - 1:45 PM [WEB](#) 1250

M,W / 2:00 PM - 5:00 PM [MEB](#) 3520

Class will usually meet every Monday and Tuesday at 12:55 p.m. in room WEB 1250 for lecture, general announcements and informational items unless notified otherwise. Persuasive oral reports will be given from 12:55 to 2:00, in room WEB 1250 starting after Fall Break. These will be videotaped for evaluation and constructive review. Persuasive oral and written formal and memo report guidelines are provided in the handouts available on our website. Please be on time at the designated class period. Experiments on unassigned days are discouraged so try to do your experiments during normal class time.

**Catalog Description:** Provides the opportunity to analyze and optimize processes and products by several means: experimentation, simulation, instrumentation, and control. Hands-on experience with real systems is emphasized as are communication skills and teamwork.

**LEARNING OBJECTIVES:**

1. Apply concepts from heat transfer, fluid mechanics, mass transfer, process control and thermodynamics to model and analyze the performance of unit operations equipment.
2. Apply concepts from mathematics to model and analyze the performance of unit operations equipment.
3. Compute description statistics (e.g. sample mean, sample standard deviation) and apply methods of statistical inference (e.g. hypothesis test, confidence intervals) to analyze experimental data sets.
4. Develop specific experimental objectives to meet overall experimental goals.
5. Design and conduct experiments to collect data relevant to experimental objectives.
6. Analyze experimental data to obtain parameters and correlations describing unit operations equipment performance.
7. Evaluate the quality of experimental results by comparison with accepted correlations and theories and develop valid conclusions about deviations from expected equipment performance.

8. Demonstrate effective team skills including goal-setting, consensus-building, listening, role-setting, and time management.
9. Demonstrate effective leadership skills including facilitating team discussions and decisions, calling team meetings, and insuring team achieves all required tasks on schedule.
10. Produce professional-quality written reports that present, analyze, and interpret experimental results logically and which are well organized and easy to read.
11. Produce a professional-quality oral presentation that presents, analyzes, and interprets experimental results logically and which are well organized and delivered.
12. Apply concepts of professional ethics to design and conducting experiments and analyzing and interpreting experimental data.
13. Demonstrate knowledge of laboratory and process equipment and instrumentation and their capabilities and limitations.
14. Demonstrate the ability to design an experiment to meet desired needs within realistic constraints such as environmental, economic, health and safety.

**Lab Projects:** Students will be assigned to work in teams of three or four. Each student will be assigned three projects over the course of the semester with three different teams. Before beginning each project, the team must arrange to meet with the professor for a 20-30 minute preliminary laboratory conference, an oral examination, regarding the project's planning, pertinent theory, and safety concerns. As part of this meeting, the students must properly fill out, bring, and discuss a Job Hazard Analysis form. A preliminary schedule of the experiments, assignments and due dates for each student or each student group is available at the course website and canvas.

**Lab Work:** To work in the lab you must not have exposed legs (e.g. no shorts, short skirts, kilts.). You must be wearing closed toed shoes. No foods or drinks are permitted in the lab. You must familiarize yourself with the safety material provided to you by the lab manager, and cannot begin working on a project until you have passed both your preliminary lab conference and the safety meeting with the lab manager. You may not work in the lab alone or without an instructor or the lab manager present. Try to conduct all your experiments during scheduled class time; however, if more lab time is needed, contact your professor or lab manager to obtain their approval.

**Reports:** For the first project, each individual student will write a draft formal report, which includes only the Introduction and Theory sections. Each team will then write and submit one complete formal report. For the remaining two projects, each *individual* student must write one formal report and one memo report. The second formal report does not require a draft. The memo report may be completed in the second or third project period, at the student's discretion, as long as at least one student in each team writes a formal report for each project. If teams cannot come to an agreement about which team member is writing a memo report, the instructor will assign reports.

Each report must be handed in through Canvas as a single PDF file, on or before the due date and time. The graded drafts for the first report must be turned in with the final version of the team's report.

You are encouraged to bring drafts to the TA and professor throughout the project period for advice or to answer any questions about writing you may have.

**Presentations:** Near the end of the semester each team will give a 12 minute persuasive presentation (+3 minutes for questions) on a contemporary society issue, involving engineering. Your presentations should focus on the ethical issues relevant to the topic and develop a persuasive argument for what you deem to be the most ethical approach in addressing it. A list of possible topics may be found at the

course website. You may select a topic from the list or select your own. However, each presentation topic must be sufficiently unique and approved by the instructor.

**Grading:** A detailed explanation of the grading (rubrics) for 4903 may be found on the Canvas site. The grading breakdown for 4903 is shown below.

Preliminary Lab Conference Meetings and JSA	10%
Individual Draft Report	10%
Team Formal Report	10%
Individual Formal Report II	20%
Individual Memo Report	20%
Individual Persuasive Presentation	20%
Homework	5%
Professionalism	5%

**Penalties:** Assignments handed in late will receive a 10% penalty for the first day late (or fraction thereof), and an additional 2% penalty for each additional day (or fraction thereof) late.

**Grade Disputes:** Grade disputes beyond simple addition errors should be address to the instructor in writing using a memo format. The reason for the dispute should be clearly stated in the memo and a copy of the student's work in question should be attached to the memo.

**Professionalism:** In addition to the three laboratory reports and the oral presentation, notice that a portion of your grade depends upon several small homework assignments, each holding an equal proportion of that 5% homework total. Additionally, there is a 5% "professionalism" score. You will be required to arrange meetings with the TA or instructor outside of class time to help prepare for your oral presentations and edit your reports. One factor that will affect the professionalism score is your preparedness for and attendance at these meetings (50% of the professionalism score). The other factor that will affect your professionalism score is your attendance at the presentations of your peers and submission of your peer evaluations (50% of the professionalism score). This score will be calculated by the percentage of presentations and evaluations completed, after allowing for three unexcused missed presentations.

**Homework:** Assignments are made periodically and are typically due on Fridays at 1 pm with submission through Canvas.

**TEXT, MATERIALS, FEES:**

There is a special laboratory fee of \$100. The text for the course is available from the copy center and online at [https://www.che.utah.edu/projects\\_lab/handbook](https://www.che.utah.edu/projects_lab/handbook). You must also keep an approved laboratory notebook (available in the bookstore). It is recommended that you have access to *Perry's Chemical Engineers Handbook*, and *Writing Style and Standards in Undergraduate Reports*, by Donnell, Jeter, MacDougall and Snedeker (ISBN 978-1-932780-09-3). Lab coats, and safety glasses will be supplied by the department. Proper use of safety equipment, maintenance of your laboratory workspace and proper record keeping in the lab book will have bearing on each report grade.

*The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.*

### **Online Material:**

The projects lab has a dedicated site with which you should become familiar, [www.che.utah.edu/projects\\_lab](http://www.che.utah.edu/projects_lab). On this site you may find equipment manuals, SOPs, and more. Oral and written report guidelines are provided in the course handbook, and are also made available online at [https://www.che.utah.edu/projects\\_lab/handbook](https://www.che.utah.edu/projects_lab/handbook). Lecture overheads and other miscellaneous course material may be found on the Canvas site.

### **Nondiscrimination and Disability Access Statement:**

We, the instructors of CH EN 4903, expect our class to be a place where you will be treated with respect. For any professional engineer, it is a vital career skill to be able to work harmoniously with a diversity of individuals and draw on their unique strengths. We welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class should work to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

*The University of Utah is fully committed to affirmative action and to its policies of nondiscrimination and equal opportunity in all programs, activities, and employment with regard to race, color, national origin, sex, age, status as a person with a disability, religion, sexual orientation, and status as a veteran or disabled veteran. The University seeks to provide equal access to its programs, services and activities for people with disabilities. Reasonable prior notice is needed to arrange accommodations. Evidence of practices not consistent with these policies should be reported to the Office of Equal Opportunity and Affirmative Action, 801-581-8365 (V/TDD).*

*Upon request, this information is available in alternative formats, such as cassette, Braille, or large print.*

### **Addressing Sexual Misconduct**

*Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677 (COPS).*